Course Outcome 3

Experiment 14 **Date:**

Method Overloading

Aim:

Write a java program to calculate the area of different shapes namely circle, rectangle and triangle using the concept of method overloading.

Program

```
import java.util.*;
import java.math.*;
class Area{
void findArea(int r){
double area1=3.14*r*r;
System.out.println("Area of circle:"+area1);
}
void findArea(int l,int b)
{
int area2=l*b;
System.out.println("Area of Rectangle:"+area2);
}
void findArea(int x,int y,int z)
{
float s=(float)(x+y+z)/2;
float area=s*(s-x)*(s-y)*(s-z);
double area3=Math.sqrt(area);
System.out.println(s);
System.out.println("Area of Triangle:"+area3);
}
}
class AreaCalculation
{
public static void main(String args[])
{
Scanner sc=new Scanner(System.in);
Area a1=new Area();
System.out.println("enter radius of circle");
int rd=sc.nextInt();
```

```
sc.nextLine();
a1.findArea(rd);
System.out.println("enter length of rectangle");
int lh=sc.nextInt();
sc.nextLine();
System.out.println("enter breadth of rectangle");
int bh=sc.nextInt();
sc.nextLine();
a1.findArea(lh,bh);
System.out.println("enter side1 of triangle");
int s1=sc.nextInt();
sc.nextLine();
System.out.println("enter side2 of triangle");
int s2=sc.nextInt();
sc.nextLine();
System.out.println("enter side3 of triangle");
int s3=sc.nextInt();
sc.nextLine();
a1.findArea(s1,s2,s3);
}
}
```

Output

```
mits@mits-Veriton-M200-H510:~/gokul java$ java AreaCalculation
enter radius of circle
10
Area of circle:314.0
enter length of rectangle
12
enter breadth of rectangle
14
Area of Rectangle:168
enter side1 of triangle
7
enter side2 of triangle
8
enter side3 of triangle
9
Area of Triangle:26.832815729997478
```

Experiment 15 Date:

Single Inheritance and Array of Objects

Aim:

Create a class 'Employee' with data members Empid, Name, Salary, Address and constructors to initialize the data members. Create another class 'Teacher' that inherit the properties of class employee and contain its own data members department, Subjects taught and constructors to initialize these data members and also include display function to display all the data members. Use array of objects to display details of N teachers.

Program

```
import java.util.*;
class Employee
{
int empid;
String name;
int salary;
String address;
Employee(int id,String nm,int s,String ad)
{
empid=id;
name=nm;
salary=s;
address=ad;
}
}

class Teacher extends Employee
{
String dept;
String sub;
Teacher(int id,String nm,int s,String ad,String dp,String sb)
{
super(id,nm,s,ad);
dept=dp;
sub=sb;
}
```

```
void displayDetails()
{
System.out.println("Employee Id:"+empid);
System.out.println("Employee Name:"+name);
System.out.println("Employee Salary:"+salary);
System.out.println("Employee Address:"+address);
System.out.println("Teacher Department:"+dept);
System.out.println("Teacehr Subject:"+sub);
System.out.println();
}
}

class EmployeeTeacherDetails
{
public static void main(String args[])
{
Scanner sc=new Scanner(System.in);
System.out.println("enter no of values");
int n=sc.nextInt();
sc.nextLine();
Teacher t1[]=new Teacher[n];
for(int i=0;i<n;i++)
{
System.out.println("enter employee id");
int eid=sc.nextInt();
sc.nextLine();
System.out.println("enter employee name");
String ename=sc.nextLine();
System.out.println("enter employee salary");
int esal=sc.nextInt();
sc.nextLine();
System.out.println("enter employee address");
String eadd=sc.nextLine();
System.out.println("enter teacher department");
String edep=sc.nextLine();
System.out.println("enter teacher subject");
String esub=sc.nextLine();
t1[i]=new Teacher(eid,ename,esal,eadd,edep,esub);
}
System.out.println();
```

```
System.out.println("Employee Details");
for(int i=0;i<n;i++)
{
t1[i].displayDetails();
}
}
}
```

Output

```
mits@mits-Veriton-M200-H510:~/gokul java$ java EmployeeTeacherDetails
enter no of values
2
enter employee id
101
enter employee name
gokul
enter employee salary
45000
enter employee address
ernakulam
enter teacher department
bca
enter teacher subject
java
enter employee id
102
enter employee name
abhijith
enter employee salary
50000
enter employee address
alappuzha
enter teacher department
mca
enter teacher subject
python

Employee Details
Employee Id:101
```

Employee Name:gokul
Employee Salary:45000
Employee Address:ernakulam
Teacher Department:bca
Teacehr Subject:java

Employee Id:102
Employee Name:abhijith
Employee Salary:50000
Employee Address:alappuzha
Teacher Department:mca
Teacehr Subject:python

Experiment 16 Date:

Multilevel Inheritance and Array of Objects

Aim:

Create a class 'Person' with data members Name, Gender, Address, Age and a constructor to initialize the data members and another class 'Employee' that inherits the properties of class Person and also contains its own data members like Empid, Company_name, Qualification, Salary and its own constructor. Create another class 'Teacher' that inherits the properties of class Employee and contains its own data members like Subject, Department, Teacherid and also contain constructors and methods to display the data members. Use array of objects to display details of N teachers.

Program

```
import java.util.*;
class Person
{
String name;
String gender;
String address;
int age;
Person(String nm,String gn,String ad,int ag)
{
name=nm;
gender=gn;
address=ad;
age=ag;
}
}
class Employee extends Person
{
int empid;
String cname;
String qualfy;
int salary;
Employee(String nm,String gn,String ad,int ag,int eid,String cnm,String qf,int sf)
{
```

```
super(nm,gn,ad,ag);
empid=eid;
cname=cnm;
qualfy=qf;
salary=sf;
}
}
class Teacher extends Employee
{
int teachid;
String subject;
String dept;
Teacher(String nm,String gn,String ad,int ag,int eid,String cnm,String qf,int sf,int
tid,String sub,String dep)
{
super(nm,gn,ad,ag,eid,cnm,qf,sf);
teachid=tid;
subject=sub;
dept=dep;
}
void displayDetails()
{
System.out.println("Person Name:"+name);
System.out.println("Person gender:"+gender);
System.out.println("Person Address:"+address);
System.out.println("Person Age:"+age);
System.out.println("Employee Id:"+empid);
System.out.println("Employee Company Name:"+cname);
System.out.println("Employee Qualification:"+qualfy);
System.out.println("Employee Salary:"+salary);
System.out.println("Teacher Id:"+teachid);
System.out.println("Teacher Subject:"+subject);
System.out.println("Teacher Department:"+dept);
}
}

class PersonEmployeeTeacherDetails
{
public static void main(String args[])
{
```

```
Scanner sc=new Scanner(System.in);
System.out.println("enter no of values");
int n=sc.nextInt();
sc.nextLine();
Teacher t1[]=new Teacher[n];
for(int i=0;i<n;i++)
{
System.out.println("enter person name");
String pname=sc.nextLine();
System.out.println("enter person gender");
String pgen=sc.nextLine();
System.out.println("enter person address");
String padd=sc.nextLine();
System.out.println("enter person age");
int pae=sc.nextInt();
sc.nextLine();
System.out.println("enter employee id");
int ed=sc.nextInt();
sc.nextLine();
System.out.println("enter employee company name");
String ecname=sc.nextLine();
System.out.println("enter employee qualification");
String eqlf=sc.nextLine();
System.out.println("enter employee salary");
int esal=sc.nextInt();
sc.nextLine();
System.out.println("enter teacher id");
int td=sc.nextInt();
sc.nextLine();
System.out.println("enter teacher subject");
String tsub=sc.nextLine();
System.out.println("enter teacher department");
String tdep=sc.nextLine();
t1[i]=new Teacher(pname,pgen,padd,pae,ed,ecname,eqlf,esal,td,tsub,tdep);
}
System.out.println();
System.out.println("Details");
for(int i=0;i<n;i++)
{
t1[i].displayDetails();
```

```
System.out.println();
}
}
}
```

Output

```
mits@mits-Veriton-M200-H510:~/gokul java$ java PersonEmployeeTeacherDetails
enter no of values
2
enter person name
gokul
enter person gender
male
enter person address
ernakulam
enter person age
22
enter employee id
101
enter employee company name
ibm
enter employee qualification
mca
enter employee salary
45000
enter teacher id
201
enter teacher subject
java
enter teacher department
mca
enter person name
abhijith
enter person gender
male
enter person address
alappuzha
enter person age
23
```

enter employee id
102
enter employee company name
tcs
enter employee qualification
mca
enter employee salary
50000
enter teacher id
202
enter teacher subject
python
enter teacher department
mca

Details
Person Name:gokul
Person gender:male
Person Address:ernakulam
Person Age:22
Employee Id:101
Employee Company Name:ibm
Employee Qualification:mca
Employee Salary:45000
Teacher Id:201
Teacher Subject:java
Teacher Department:mca

Person Name:abhijith
Person gender:male
Person Address:alappuzha
Person Age:23
Employee Id:102
Employee Company Name:tcs
Employee Qualification:mca
Employee Salary:50000
Teacher Id:202
Teacher Subject:python
Teacher Department:mca

Experiment 17 **Date:**

Interface 1- Find area and perimeter of objects

Aim:

Create an interface having prototypes of functions area() and perimeter(). Create two classes Circle and Rectangle which implements the above interface. Create a menu driven program to find area and perimeter of objects.

Program

```
import java.util.*;
interface Shape
{
double area();
double perimeter();
}

class Circle implements Shape
{
private double radius;
Circle(double radius)
{
this.radius = radius;
}

public double area()
{
return Math.PI * radius * radius;
}
public double perimeter()
{
return 2 * 3.12 * radius;
}
}

class Rectangle implements Shape
{
private double length, width;
Rectangle(double length, double width)
```

```
{
this.length = length;
this.width = width;
}
public double area()
{
return length * width;
}
public double perimeter()
{
return 2 * (length + width);
}
}

class AreaPerimeter
{
public static void main(String[] args)
{
Scanner sc = new Scanner(System.in);
int ch;
do
{
System.out.println("Menu:\n1.Circle\n2.Rectangle\n3.Exit");
System.out.print("Enter your choice: ");
ch=sc.nextInt();
switch(ch)
{
case 1:
System.out.print("Enter radius of circle: ");
double r = sc.nextDouble();
Circle circle = new Circle(r);
System.out.printf("Area of Circle: %.2f\n", circle.area());
System.out.printf("Perimeter of Circle: %.2f\n", circle.perimeter());
break;
case 2:
System.out.print("Enter length of rectangle: ");
double length = sc.nextDouble();
System.out.print("Enter width of rectangle: ");
double width = sc.nextDouble();
Rectangle rectangle = new Rectangle(length, width);
```

```
System.out.printf("Area of Rectangle: %.2f\n", rectangle.area());
System.out.printf("Perimeter of Rectangle: %.2f\n", rectangle.perimeter());
break;
case 3:
System.out.println("User exit");
break;
default:
System.out.println("Invalid choice! Try again.");
}
}
while(ch != 3);
}
}
```

Output

```
mits@mits-Veriton-M200-H510:~/gokul java$ java AreaPerimeter
Menu:
1.Circle
2.Rectangle
3.Exit
Enter your choice: 1
Enter radius of circle: 10
Area of Circle: 314.16
Perimeter of Circle: 62.40
Menu:
1.Circle
2.Rectangle
3.Exit
Enter your choice: 2
Enter length of rectangle: 4
Enter width of rectangle: 8
Area of Rectangle: 32.00
Perimeter of Rectangle: 24.00
Menu:
1.Circle
2.Rectangle
3.Exit
Enter your choice: 3
User exit
```

Experiment 18 **Date:**

Interface 2- Prepare bill with the given format

Aim:

Prepare bill with the given format using calculate method from interface.

Order No.:

Date :

Product Id	Name	Quantity	unit price	Total
101	A	2	25	50
102	B	1	100	100
			Net. Amount	150

Program

```
import java.util.*;
interface Bill
{
void calculate_total();
}
class BillCalculate implements Bill
{
int product_id,quantity;
float unit_price,total_price;
String product_name;
static float net_total=0;
BillCalculate(int pid,String pname,int qty,float price)
{
product_id = pid;
product_name = pname;
quantity = qty;
unit_price = price;
calculate_total();
}
public void calculate_total()
{
```

```
total_price = quantity * unit_price;
calculate_net_total();
}
void calculate_net_total()
{
net_total+=total_price;
}
void display()
{
System.out.println(product_id+"\t\t"+product_name+"\t\t"+quantity+"\t\t"+unit_price+"
\t\t"+total_price);
System.out.println("---------------------------------------------------------------------");
}
static void display_net_total(){
System.out.println("\t\t\tNet Amount\t"+net_total);
}
}
class ProductBill
{
public static void main(String args[])
{
Scanner sc =new Scanner(System.in);
int pid,qty;
String pname;
float price;
System.out.println("Product list\n----------");
System.out.println("Product id\tProduct name\tPrice\n----------------------");
System.out.println("101\t\tA\t\t20");
System.out.println("102\t\tB\t\t40");
System.out.println("Enter the number of products needed : ");
int n = sc.nextInt();
sc.nextLine();
BillCalculate bc[] = new BillCalculate[n];
for(int i=0;i<n;i++)
{
System.out.println("Enter product id");
pid = sc.nextInt();
sc.nextLine();
System.out.println("Enter product name");
pname = sc.nextLine();
```

```
System.out.println("Enter no of quantity");
qty = sc.nextInt();
sc.nextLine();
System.out.println("Enter unit price");
price = sc.nextFloat();
sc.nextLine();
bc[i] = new BillCalculate(pid,pname,qty,price);
}
System.out.println("Product id\tProduct name\tQuantity\tUnit Price\tTotal");
System.out.println("-------------------------------------------------------------------------");
for(BillCalculate b:bc)
{
b.display();
}
BillCalculate.display_net_total();
}
}
```

Output

```
mits@mits-Veriton-M200-H510:~/gokul java$ java ProductBill
Product list
----------
Product id      Product name    Price
----------------------
101             A               20
102             B               40
Enter the number of products needed :
2
Enter product id
101
Enter product name
A
Enter no of quantity
4
Enter unit price
20
Enter product id
102
Enter product name
```

B
Enter no of quantity
7
Enter unit price
40

Product id	Product name	Quantity	Unit Price	Total
102	A	4	20.0	80.0
101	B	7	40.0	280.0
	Net Amount	360.0		

Experiment 19 **Date:**

Package 1- Find the area of different shapes

Aim:

Create a Graphics package that has classes for shapes Rectangle, Triangle, Square and Circle. Test the package by finding the area of these figures.

Hint:- Create 3 java files for calculate the area 3 different shapes in the directory Shapes inside the directory where the java program is stored. Then import all the class files inside the package Shapes to our original program.

Equation for area of a circle= A=πr^2 .

Area of a triangle = √(s(s-a)(S-b)(S-c))

Area of a rectangle= l*b

Program

Folder:shape

Circle.java

```
package shape;
public class Circle
{
public double findArea(int r)
{
return 3.14*r*r;
}
}
```

Square.java

```
package shape;
public class Square
{
public int findArea(int a)
{
return a*a;
}
}
```

Rectangle.java

```
package shape;
public class Rectangle
{
public int findArea(int l,int b)
{
return l*b;
}
}
```

Triangle.java

```
package shape;
public class Triangle
{
public double findArea(int a,int b,int c)
{
float s=(a+b+c)/2;
double area=s*(s-a)*(s-b)*(s-c);
return Math.sqrt(area);
}
}
```

Main

```
import java.util.*;
import shape.Circle;
import shape.Rectangle;
import shape.Square;
import shape.Triangle;

class ShapeAreas
{
public static void main(String args[])
{
Scanner sc=new Scanner(System.in);
Square s=new Square();
Circle c=new Circle();
Rectangle r=new Rectangle();
Triangle t=new Triangle();
```

```
System.out.println("enter side of square");
int a=sc.nextInt();
sc.nextLine();
System.out.println("area of square: "+s.findArea(a));
System.out.println("enter length of rectangle");
int l=sc.nextInt();
sc.nextLine();
System.out.println("enter breadth of rectangle");
int b=sc.nextInt();
sc.nextLine();
System.out.println("area of rectangle: "+r.findArea(l,b));
System.out.println("enter radius of circle");
int rd=sc.nextInt();
sc.nextLine();
System.out.println("area of circle: "+c.findArea(rd));
System.out.println("enter side1 of triangle");
int s1=sc.nextInt();
sc.nextLine();
System.out.println("enter side2 of triangle");
int s2=sc.nextInt();
sc.nextLine();
System.out.println("enter side3 of triangle");
int s3=sc.nextInt();
sc.nextLine();
System.out.println("area of triangle: "+t.findArea(s1,s2,s3));
}
}
```

Output

```
mits@mits-Veriton-M200-H510:~/gokul java$ java ShapeAreas
enter side of square
4
area of square: 16
enter length of rectangle
5
enter breadth of rectangle
10
area of rectangle: 50
enter radius of circle
```

10
area of circle: 314.0
enter side1 of triangle
4
enter side2 of triangle
10
enter side3 of triangle
8
area of triangle: 15.198684153570664

Experiment 20 **Date:**

Package 2- Perform 4 arithmetic operations

Aim:

Create an Arithmetic package that has classes for the 4 basic arithmetic operations. Test the package by implementing all operations on two given numbers.

Program

Folder:arithmetic

Add.java

```
package arithmetic;
public class Add
{
public double add(double a, double b)
{
return a + b;
}
}
```

Subtract.java

```
package arithmetic;
public class Subtract
{
public double subtract(double a, double b)
{
return a - b;
}
}
```

Multiply.java

```
package arithmetic;
public class Multiply
{
public double multiply(double a, double b)
{
return a * b;
```

```
}
}
```

Divide.java

```
package arithmetic;
public class Divide
{
public double divide(double a, double b)
{
if (b == 0)
{
throw new ArithmeticException("Cannot divide by zero.");
}
return a / b;
}
}
```

Main

```
import arithmetic.Add;
import arithmetic.Divide;
import arithmetic.Multiply;
import arithmetic.Subtract;
import java.util.*;

class ArithmeticOperations
{
public static void main(String args[])
{
Scanner sc = new Scanner(System.in);
System.out.println("Enter number 1");
double num1 = sc.nextDouble();
System.out.println("Enter number 1");
double num2 = sc.nextDouble();
Add a1 = new Add();
Subtract s1 = new Subtract();
Multiply m1 = new Multiply();
Divide d1 = new Divide();
System.out.println("Addition: " + a1.add(num1, num2));
System.out.println("Subtraction: " + s1.subtract(num1, num2));
```

```
System.out.println("Multiplication: " + m1.multiply(num1, num2));
try
{
System.out.println("Division: " + d1.divide(num1, num2));
}
catch (ArithmeticException e)
{
System.out.println("Error: " + e.getMessage());
}
}
}
```

Output

```
mits@mits-Veriton-M200-H510:~/gokul java$ java ArithmeticOperations
Enter number 1
12
Enter number 1
4
Addition: 16.0
Subtraction: 8.0
Multiplication: 48.0
Division: 3.0
```

Experiment 21 Date:

User Defined Exception 1

Aim:

Write a user defined exception class to authenticate the user name and password.

Program

```
import java.util.*;
class UserExcptn
{
static class AuthException extends Exception
{
public AuthException(String message)
{
super(message);
}
}
public static void main(String args[])
{
String correctUsername = "admin";
String correctPassword = "admin123";
Scanner sc = new Scanner(System.in);
System.out.println("Enter username");
String username = sc.nextLine();
System.out.println("Enter password");
String password = sc.nextLine();
try
{
if (!username.equals(correctUsername) || !password.equals(correctPassword))
{
throw new AuthException("invalid username or password.");
}
System.out.println("login success");
}
catch (AuthException e)
{
System.out.println(e.getMessage());
}
```

```
}
}
```

Output

```
mits@mits-Veriton-M200-H510:~/gokul java$ java UserExcptn
Enter username
gokul
Enter password
123
invalid username or password.
mits@mits-Veriton-M200-H510:~/gokul java$ java UserExcptn
Enter username
admin
Enter password
admin123
login success
```

Experiment 22 Date:

User Defined Exception 2

Aim:

Find the average of N positive integers, raising a user defined exception for each negative input

Program

```
import java.util.*;
class AvgExcptn
{
static class NegativeNumberException extends Exception
{
public NegativeNumberException(String message)
{
super(message);
}
}
public static void main(String args[])
{
Scanner sc = new Scanner(System.in);
int n;
double sum = 0;
int count = 0;
System.out.println("enter limit");
n = sc.nextInt();
System.out.println("Enter numbers");
for (int i = 1; i <= n; i++)
{
int num = sc.nextInt();
try
{
if (num < 0)
{
throw new NegativeNumberException("negative number entered: " + num);
}
sum += num;
count++;
```

```
}
catch (NegativeNumberException e)
{
System.out.println("Error: " + e.getMessage());
}
}
if (count > 0)
{
System.out.println("Average=" + (sum / count));
}
else
{
System.out.println("invalid number");
}
}
}
```

Output

```
mits@mits-Veriton-M200-H510:~/gokul java$ java AvgExcptn
enter limit
5
Enter numbers
4
5
7
8
9
Average=6.6
mits@mits-Veriton-M200-H510:~/gokul java$ java AvgExcptn
enter limit
4
Enter numbers
2
4
-4
Error: negative number entered: -4
5
Average=3.6666666666666665
```

Experiment 23 Date:

Exception Handling

Aim:

Program to find the sum of command line arguments and count the invalid integers entered through command line.

Program

```
class ArgExcptn
{
public static void main(String args[])
{
int sum = 0;
int count = 0;
for (String arg : args)
{
try
{
int num = Integer.parseInt(arg);
sum=sum+num;
}
catch (NumberFormatException e)
{
count++;
}
}
System.out.println("Sum of valid=" + sum);
System.out.println("No of invalid=" + count);
}
}
```

Output

```
mits@mits-Veriton-M200-H510:~/gokul java$ java ArgExcptn 4 5 a
Sum of valid=9
No of invalid=1
```